Northeast Sustainable Agriculture Research and Education Program
Final Grant Report

1. Project Name and Contact Information

Title: Greenhouse Ginger Cultivation in the Northeast, Part II
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2. Goals

- To further explore an option for use of under-utilized greenhouse space
- To successfully grow and sell local culinary ginger
- To increase profit and sustainability
- To share our experiences of growing ginger through public outreach

3. Farm Profile

Old Friends Farm is Certified Organic, Certified Naturally Grown and cultivates eight acres. Our main products are cut flowers and salad greens. We also grow garlic, tomatoes, other vegetables, and shiitake mushrooms. In 2007, Old Friends Farm sold at six farmers markets per week, wholesaled to restaurants and florists, and arranged flowers for weddings and special events in the Pioneer Valley and Boston area. The farm is owned and run by two full-time partners, with a couple part-time employees and occasional added labor during peak production times.

Currently, (March 2008) we have increased to nine acres, added layer hens and winter storage crops to our product line, reduced down to four farmers markets per week, increased our wholesaling, and employ three seasonal full-time employees and two seasonal part-time employees.

4. Project Participants

This project was cooperatively executed by *Melissa Bahret* and *Casey Steinberg*, co-owners of Old Friends Farm. *Hans Leo*, project director of educational programs at Bramble Hill Farm, (Amherst, MA), offered technical assistance.

5. Project Activities

We purchased 120 pounds of yellow and white seed ginger from Kauai and Puna Organics in Hawaii. With clean tools and crates for the ginger to grow in, we sanitized the rhizomes with a mild bleach solution. The bleach dip was a 10% solution for 10 minutes. The ginger was cut into smaller pieces, containing two to four "eyes" (nodes). After curing, the ginger was planted into fabric lined nursery crates containing a custom made soil mix (recipe follows in Appendix under 'Ginger Growing Mix'). The nursery crates were stacked and placed in a heated chamber, thermostatically controlling the

temperature to be 80 degrees. The ginger was watered sparingly to deter rot until sprouting initiated.

Upon successful sprout initiation, half of the ginger (of each variety) was planted into crates filled with the custom growing mix. One half of the ginger (of each variety) was planted directly into prepared beds in an unheated, double layer hoophouse. The greenhouse group will be referred to as Group A and the hoophouse group will be referred to as Group B for the remainder of this report.

Group A was planted two inches deep, 6 rhizomes per crate. Each crate contained eight gallons of mix and was placed on pallets on the floor of the greenhouse. A drip irrigation system was positioned above the crates. As the ginger grew, additional growing mix was added to hill the ginger, to keep the growing rhizomes under at least two inches of soil.

Group B was planted into a prepared bed with a soil base. Peat, fertilizer, gypsum, and diatomaceous earth were the only amendments added to the 95' bed, using the same amounts as in Group A. Lime was expected to be added but was not needed to adjust the pH to the optimal ginger conditions of 5.5-6.5. The ginger was planted in two rows in a five foot wide bed, two inches deep in furrows. The roots were spaced between six to eight inches apart. As the ginger grew, soil was hoed into the furrows to hill the ginger.

In both groups the ginger was fertilized with four ounces of fish emulsion and 2 ounces of seaweed concentrate upon transplanting. Additional fertilizing occurred every week, consisting of a foliar spray (see Appendix under 'Weekly Foliar Fertilizer Spray'). A granular fertilizer was added two weeks after each hilling (see Appendix under 'Post Hilling Granular Fertilizer').

Harvest began in early August for Group A and late August for Group B. We harvested as needed for farmers market sales, ending our harvest in late October. We harvested Group A by lifting the plants out of the crates by their shoots and ripping off the soil and roots. Group B was lifted with a pitchfork. Both groups were washed and displayed with the foliage connected, although we gave customers the option to buy it with or without the foliage as desired. Most customers chose to purchase the foliage as well as the root.

The only significant changes to the proposed process was to not mulch Group B with straw, hoeing and hilling proved to be adequate weed control. We also had to change our outreach from a NOFA Summer Conference Farm Tour to a UMASS Twilight Tour due to scheduling problems.

6. Results

Our continued experimentation with growing ginger in the Northeast furthered our concept of the viability and demand for ginger as a local product. This second year of experimenting also helped us to realize that greenhouse cultivation may not be the best solution for under-utilized greenhouse space. The yields from both environments were comparable. Overall, the hoophouse cultivation is more cost effective than the greenhouse cultivation due to less material expense and labor costs.

The Group A ginger (greenhouse grown, in crates) yield was 375 pounds, a 1:5 yield from starter root to harvest amount. The labor time was considerable in this method, since the crates need to be filled with the custom made soil mix and harvesting takes additional time. Material expenses were $2,387, largely due to the inputs for the custom mix. Group A did not result in a profit.

The Group B ginger (hoophouse grown, in ground) yield was 360 pounds. The method of hoophouse cultivation demanded far less labor time and material inputs. We did not use the crates, custom soil mix, fabric, lime, perlite, or vermiculite demanded in greenhouse cultivation. In addition, the cost of the hoophouse structure is considerably less to rent (and maintain). Despite that Group B yield was less, it produced a profit.

Harvest amount per variety was not measured, but general observations were that the white ginger produced more harvest weight than yellow. The plant height was taller on the white plants in both growing conditions. Yellow ginger is a bit spicier, and supposedly more nutritious, and also tended to be more easily recognizable to customers. Both varieties were harvested at the 'young' ginger stage due to the compromised growing season in the Northeast, and had no tough inner fibers or outer skin. The ginger stalks from both varieties are a delicious addition to soups or can be used to make tea.

Overall, the hoophouse ginger grew surprisingly well, with less labor needs. The ginger demand continued to hold strong, as in 2006, and many customers of the previous year were eagerly awaiting harvest time. Although we sold the ginger at a price that was considerably higher than Organic ginger in the stores, it was not difficult to sell the high grade ginger.

7. Conditions

Both groups of ginger were started in nursery crates in the greenhouse in a germination tower with added electric heat. The ginger in Group A, the greenhouse grown group, was transplanted into crates and put on pallets in the center of a 25' X 100' greenhouse heated by propane. Ventilation was achieved by a thermostatically controlled peak-vent. Large fans circulated air. Group B, the hoophouse group, was planted directly into the soil. The hoophouse is not heated, has a double layer of plastic, and contained crops that could not tolerate as high of temperatures as the ginger may have been the most productive.

The growing season had atypically low humidity, which may or may not have affected the growth of the ginger. Both growing conditions had irrigation systems, so the drought outdoors was not applicable to the indoor environments.

8. Economics

The actual profit from the ginger (total sales of both groups, compensating for expenses including labor) was $2,898. Group A ginger brought in $5,625, but cost more to produce, resulting in a loss. Group B ginger grossed $5400, cost $2,441, resulting in a $2,959 profit. Without doubt, Group B, the hoophouse ginger, was the most cost effective method. (See Economics and Record Keeping chart in Appendix cost analysis numbers).

Annual material costs of the growing process in both environments are a huge expense. Although Group B was two and a half times less expensive to grow, its annual costs are high compared to its profit margin. (See Detailed Annual Material Costs of Project in Appendix). Group A had material expenses of $2,387 and Group B was $941. Finding ways to reduce these costs is essential to increasing the viability of ginger as a Northeast crop.

Some assumed costs were not actualized. The lime for pH adjusting in the hoophouse conditions was not necessary and the straw for mulching the hoophouse ginger was inhibitive to the hilling process and not necessary for weed control. It is

certainly a high labor crop, and continued refining of the process will help lower this expense.

The farm did experience some net farm income from growing hoophouse ginger. Another non-quantitative result was the novelty and increase in customers due to its alluring appeal.

9. Assessment

Seeing that the hoophouse grown ginger was more cost effective than the greenhouse grown ginger, we realized that growing ginger in the greenhouse may not be a viable solution to utilizing typically under-utilized greenhouse space. Perhaps other subtropical crops would be more cost effective grown in the greenhouse, but the ginger seems to be a better hoophouse crop. In addition, had the hoophouse ginger been planted along side other heat tolerant crops, it may have yielded more.

It certainly can be a successful locally grown crop, and has helped our farm increase its profit and sustainability. Further experimentation is needed to see if seed roots can be saved year to year, and if second year ginger (typical ginger with fibrous inner roots and tan colored tough skin) would experience similar demand and be cost effective also.

10. Adoption

We are growing ginger again in 2008. It will be only in the hoophouse, but will be pre-sprouted in nursery crates in the greenhouse before transplanting. We are revising our inputs to reduce costs, and plan on using on-farm composted chicken manure as our fertilizer amendment to reduce off-farm fertilizer needs. We are excited to offer it again to our customers and hope that other cool climate farmers will be inspired to try growing sub-tropicals too.

11. Outreach

We offered a Twilight Tour of our farm and ginger production on October 10th 2007. (Approved substitution due to scheduling problem for the originally approved outreach as a NOFA Mass. Summer Conference Farm Tour). We advertised at our farmers markets and through the University of Massachusetts Agriculture Extension website and email list serve and had over forty attendants, mainly local farmers. In addition, on February 16th 2008, we presented a workshop at the NOFA Vermont Winter Conference (see photos from slide show attached). About thirty people attend the workshop, including some farmers and many home-growers. This summer (2008), Growing For Market publication will run an article on Ginger Production in the Northeast (see article attached with confirmation note from Lynn Byczynski, editor). We posted information on our website about the ginger project and how anyone interested can obtain further information on the project.

12. Report Summary

The purpose of this project was to continue to explore growing ginger as a way to expand the use of a greenhouse structure, to increase profit and sustainability for the farm, to supply locally grow ginger to our customers, and to share our findings with other

growers. The ginger was pre-sprouted in a custom-made soil mix and transplanted into crates in the greenhouse and some directly in the soil of a hoophouse. The ginger grows in a sub tropical environment, so mimicking those conditions was key to successful yield. The ginger was harvested as needed from August through October, and sold at farmers markets. The product was of high quality and there was high demand. The hoophouse grown ginger proved to be a better method than the greenhouse grown ginger, not because of increased yield but because of lower labor investment and material expenses. This is a marginal crop for expanding the use of a greenhouse structure, and other ideas should be investigated. It is an economically viable hoophouse crop, and will hopefully progress to being a typical northeast grown crop.

Melissa J. Bahret — Date: 4/20/8

Melissa J. Bahret

Attachments:

- Appendix containing Ginger Growing Mix Ratio, Weekly Foliar Fertilizer Spray Ratio, and Post-Hilling Granular Fertilizer Amendment
- Economics and Record Keeping Chart
- Detailed Annual Material Costs of Project Chart
- Selection of photos from slide show presentation at NOFA Vermont Winter Conference
- Growing For Market Article (to be run in Summer 2008)
- Copy of confirmation email from editor of Growing for Market

Appendix

Ginger Growing Mix Ratio:
2 cu ft fine peat moss
4 cu ft premium lite growing mix
1 cu ft perlite
1 cu ft vermiculite
20 tbsp gypsum
4 tbsp granular 5-4-8 fertilizer
½ gallon diatomatous earth
lime to reach pH of 5.5-6.5

Weekly Foliar Fertilizer Spray Ratio:
3 tbsp seaweed concentrate
6 tbsp fish emulsion
2 gallons water

Post Hilling Granular Fertilizer:
(per crate or per four feet of bed space)
2 tbsp granular 5-4-8 fertilizer

2007 Ginger Cultivation Trials in Northeast Greenhouse and Hoophouse Conditions

Economics & Record Keeping

	Unit or Rate	GROUP A Pre-sprouted, Greenhouse cultivated	GROUP B Pre-sprouted, Hoophouse cultivated	Total
Material Expense	dollars	$2,386.52	$940.53	
Labor Time Invested	hours	132	60	192
Labor Expense	$25 dollars/hr	$3,300.00	$1,500	$4,800
Crop Yield	pounds	375	360	735
Ratio of Seed to Yield	from 60 pounds seed	1:5	1:4.8	
Selling Price	dollar/pound	$15.00	$15.00	
Total Sales	dollars	$5,625.00	$5,400.00	$11,025.00
Total Expenses	dollars	$5,686.52	$2,441	$8,127
Profit	dollars	**-$61.52**	**$2,959**	**$2,898**

Detailed Annual Material Costs of Project

Use		Presprouted, Greenhouse Cultivated (Group A)	Presprouted, Hoophouse Cultivated (Group B)	Total
disinfectant	**bleach**	$2.00	$2.00	$4.00
seed	**bulk ginger**	$300.00	$300.00	$600.00
liner	**fabric**	$150.00	$0.00	$150.00
custom mix	**lite soil mix**	$422.00	$0.00	$422.00
custom mix	**peat**	$84.90	$84.90	$169.80
fertilizer	**5-4-8 granular fertilizer**	$172.50	$172.50	$345.00
amendment	**lime**	$8.76	$0.00	$8.76
amendment	**perlite**	$194.50	$0.00	$194.50
amendment	**vermiculite**	$238.20	$0.00	$238.20
amendment	**gypsum**	$5.25	$5.25	$10.49
amendment	**diatomaceous earth**	$40.00	$40.00	$80.00
fertilizer	**seaweed concentrate**	$9.50	$9.50	$19.00
fertilizer	**fish emulsion**	$78.95	$78.95	$157.90
sales wrapping	**wax bags for market sales**	$64.46	$61.94	$126.40
sales wrapping	**label for wax bag**	$25.50	$24.50	$50.00
container	**bulb crates**	$90.00	$0.00	$90.00
rent	**rent (1/4 of greenhouse; 1/5 of hoophouse)**	$500.00	$161.00	$661.00
TOTAL MATERIAL EXPENSE:		**$2,386.52**	**$940.53**	**$3,327**